



ART. IX. DESCRIPTION OF A NEW RACE OF
SIREN INTERMEDIA LE CONTE

BY COLEMAN J. GOIN
UNIVERSITY OF FLORIDA¹

In the course of my studies of the Sirenidae it has become evident that *Siren intermedia* is composed of two valid subspecies. Typical *intermedia* is confined to the coastal plain from Virginia to the Florida Parishes of Louisiana and south to central Florida, while the population west of this region represents a race for which no name is available. As the full discussion, now in preparation, of the salamanders of this family will not be completed for several years, it seems desirable to describe this form at the present time so that it may be included in Dr. Sherman C. Bishop's forthcoming manual of the salamanders. It gives me great pleasure to name this race after M. Graham Netting, who first suggested that I study the Sirenidae.

Siren intermedia nettingi, new subspecies

PALE LESSER SIREN

Type.—Carnegie Museum, no. 7580, adult female, collected in May, 1928, by Byron C. Marshall.

Type locality.—Imboden, Lawrence County, Arkansas.

Paratypes.—One hundred and eighty-eight, as follows:² ARKANSAS—AMNH 36285-89, 37232, ANSP 21962, SCB (5 specimens), CM 7581, ChM 39.277.5 (2), UMMZ 68381 (2), 68382 (2), UR 948-49, from Imboden, Lawrence County; AMNH 22923-28, from six miles south of Imboden, Lawrence County; and UMMZ 84356, from near Paragould, Greene County. ILLINOIS—ANSP 552, from Alton, Madison County; CM 19078-81, from five miles east of Du Quoin, Perry County; MCZ 941; MNSS 272 (33 specimens + 96 unnumbered specimens), from one mile northeast of Herrin, Williamson County; and MNSS 273 (2), from five miles northeast of

¹ Contribution from the Department of Biology, University of Florida.

² AMNH, American Museum of Natural History; ANSP, Academy of Natural Sciences of Philadelphia; SCB, private collection of Sherman C. Bishop; CM, Carnegie Museum; ChM, Charleston Museum; FMNH, Field Museum of Natural History; MCZ, Museum of Comparative Zoölogy; MNSS, Museum of Natural and Social Sciences, Southern Illinois Normal University; UMMZ, University of Michigan, Museum of Zoology; UR, University of Rochester, Museum of Natural History.

Jonesboro, Union County. INDIANA—MCZ 8601-04, from Vigo County. LOUISIANA—CM 20142-55, from Forest Hill, Rapides Parish; and MCZ 250, from New Orleans, Orleans Parish. TENNESSEE—UMMZ 84354, from Bayou du Chien, Walnut Log, Obion County; UMMZ 84355, from near Memphis, Shelby County; and UMMZ 86391, from near Nashville, Davidson County. TEXAS—FMNH 31797, from College Station, Brazos County.

Diagnosis.—A *Siren* with from 33 to 37 costal grooves, mode 35; an average tail length in total length ratio of 3.21; and a maximum total length of 396 mm. *S. i. nettingi* characteristically has a dorsum shading from olive to gray, with scattered minute black spots; the venter is marked with well defined light spots. It can be distinguished from *intermedia* by its larger size, by the presence of about two more costal grooves (usually 33 in *intermedia*, 35 in *nettingi*), and in having the venter marked with light spots rather than being uniformly dark. From *lacertina* it differs in its smaller size, the smaller number of costal grooves, and in lacking the numerous, circular, well-defined, black spots on the top of head, dorsum, and sides.

Description of type.—Skin generally smooth in appearance, but head pocked with indistinct pits of variable size, and body sprinkled with smaller pits visible under magnification; no large glands present. Two parallel rows of small, indistinct mucous pores on each side: a dorsolateral row beginning on side of head anterior to gills, extending backward and fading out on posterior third of body, and a lateral row beginning behind limb and continuing posteriorly to region above vent. Individual pores grouped in short series of two or three almost tangent pores, each series usually placed in the center of a costal fold. A faint, shallow depression on head extending from region between eyes to top of head; another shallow depression on each side of head extending from top of head downward and backward about three millimeters, then curving downward for about the same distance, then curving forward and downward, terminating at a point between the eye and base of lower gill; a median longitudinal depression beginning in region above and anterior to base of gills and continuing longitudinally backward until it merges insensibly with a shallow mid-dorsal groove at back of head.

Head somewhat elongate, narrowing gradually from widest point, which is just behind base of jaws, to about level of eyes where it begins to taper to a rounded snout; a slight swelling on each parietal produced by jaw muscles. Head bluntly pointed in outline as seen from side, profile of top a smooth curve to parietal swellings, followed by a very slight de-

pression from parietal swellings to region above limbs. Mouth small, consisting of a crescentic, transverse portion anteriorly, followed by an inward curving arc on each side, ending on the ventral surface on a line dropped from anterior border of eye. Outline of upper jaw convex as seen from side due to pendulous upper lip; upper jaw projecting beyond lower. No canthus rostralis. Loreal region slightly convex. Nostril an elongate longitudinal slit, ventrolateral in position, its anterior corner on a line with the anterior point of the upper lip, not visible from above. Internarial distance (ventrally) three times diameter of eye. Eye small, not protuberant, without eyelids, but completely covered with a thin membrane; its diameter about one-third its distance from posterior corner of nostril. Interorbital distance about three times diameter of eye. Head width 10.8 times in body length; head length 7.2 times in body length.

Body slender, ovate in cross section, slightly deeper than wide, without any noticeable constriction at neck; a narrow mid-dorsal groove, a shallow longitudinal dorsolateral depression extending from base of gills to proximal third of tail, a shallow midventral depression from region between limbs to vent. Costal grooves 36, distinct, connecting across abdomen, extending well up on sides where they become indistinct. Vent small, ovate; internal lips heavily folded.

Tail 2.3 times in snout-to-vent length; ovoid in vertical cross section at base, becoming more and more compressed to flat tip. A low dorsal keel beginning on posterior eighth of body and continuing posteriorly, changing to a low fin on distal four-fifths of tail, fin never quite so broad as tail musculature except at extreme tip. Ventral surface flat at base with a narrow fin on distal two-thirds; tip of tail rounded.

Forelimbs present, small. Fingers four, short, stout, 2-3-1-4 in order of decreasing length, not webbed. Fingers three and four of both feet with brown, claw-like, horny caps covering the tips. No metacarpal tubercles present.

External gills three; the gills, with all their filaments, are compressed into a knob-like structure and covered with a membrane so that the gills appear to be reduced unless examined closely (but not so in most of the paratypes). On left side, upper gill longest, extending to insertion of limb when appressed, middle gill shorter, about two-thirds length of upper, lower gill half length of middle, no distinct secondary branches or filaments; branchial openings three, anterior the smallest, middle the largest, covered by bases of gills when these are appressed. On right side, gills uniformly longer, upper extending beyond insertion of limb when ap-

pressed, middle shorter, extending to base of limb, lower much shorter, one-third length of middle, reduced but with secondary branches on upper and middle gills; branchial openings two, anterior smallest, covered by bases of gills when these are appressed.

Tongue small, well back in mouth, its acutely pointed anterior third free (the upper surface remains tightly pressed against the roof of the mouth in preserved specimens even though mouth has been cut open at angles of jaws). A dark horny sheath present at anterior end of lower jaw in the form of a poorly developed transverse ridge curving backward at its outer ends; a small oval horny patch at anterior edge of upper jaw which is but slightly darker than the surrounding tissue. Lower jaw with rather long, recurved, sharply pointed, well-separated teeth arranged in two rather irregular rows on the anterior portion of each mandible, ending at a point approximately below the eye, the two groups separated anteriorly by more than the width of each series and diverging rapidly posteriorly. Two elongate patches of prevomerine teeth beginning in anterior portion of roof of mouth, the two patches separated anteriorly by a narrow groove which widens rapidly posteriorly, the rearmost teeth in each patch being separated by almost twice the length of a naris; the teeth in each patch long for a salamander of this size, sharply pointed, about 32 in number; arranged in short diagonal rows of four or five teeth each for about five rows, then a short diastema preceding several short oblique rows. Internal nares elongate, longitudinal openings slightly diagonal in position, each deeply buried in a fold of tissue that is apparently capable of tight closure.

Measurements of type (in millimeters).—Head length (tip of snout to base of foremost gill), 19.5; body length, 140; tail length, 69.5; forelimb length, 12; total length, 229; head width (maximum), 13; body width (maximum), 12; body depth (maximum), 13.

Coloration of type (preserved).—Top of head, dorsum, and sides Deep Mouse Gray³ with minute black spots on top of head, dorsum, and dorsolateral regions, most heavily concentrated in dorsolateral regions. An indistinct, broken, Olive Lake stripe on each side of head from eye to base of gill. Gills, chin, and legs Light Grayish Olive. Entire venter Deep Olive-Gray. Dorsal and ventral tail fins between Mouse Gray and Deep Mouse Gray, with minute scattered spots of black pigment.

Variation.—In size the paratypes of *nettingi* range from 20 to 396 mm

³ All colors capitalized are from Ridgway, "Color Standards and Nomenclature," 1912.

in total length, and from 15 to 282 mm in snout-to-vent length. The ratio of tail length in total length in one hundred mature individuals ranges from 2.84 to 4.24, average 3.21. In twenty-three mature specimens of typical *intermedia* the ratio of tail length in total length ranges from 1.40 to 3.47, average 2.80. Although there is overlapping between the two races in this character, it is apparent that *nettingi* tends to have a relatively shorter tail than does *intermedia*.

In the paratypes on which costal grooves can be counted it was found that they vary from 33 to 37, 33 occurring three times, 34 thirty times, 35 fifty-five times, 36 twenty-two times, and 37 once. Here again we find some overlapping with *intermedia*, which, in the specimens on which costal grooves can be counted, has 31 occurring once, 32 eleven times, 33 sixteen times, and 34 eight times.

The fingers are normally 2-3-1-4 in order of decreasing length but sometimes they are 2-1-3-4 (9 specimens), more rarely 3-2-1-4 (1 specimen). Sharp, brown, claw-like horny caps are usually present on all fingers in specimens that have not died before preservation, but occasionally they are absent on one or more fingers in otherwise perfect specimens.

In most of the paratypes the gills are fringed and well developed, but in some specimens (including the type) they are compressed into knob-like structures that appear to lack filaments unless examined with care.

Coloration and markings in the extensive series of paratypes range from nearly uniformly black (specimens which have been long preserved or which died before preservation), to a light gray above with scattered, small black spots and with a pale venter on which numerous spots and blotches of light immaculate areas occur. Young specimens tend to have more light markings on the head than do mature individuals. In many immature specimens the tip of the snout is immaculate and there is a longitudinal light bar above each eye and another transverse light bar across the top of the head.

Coloration in life (based on CM 20154-55, from Forest Hill, Rapides Parish, La.).—Top of head Olive-Citrine to Brownish-Olive changing to Serpentine-Green on the sides. Dorsum Dark Olive to Deep Olive. Venter Pallid Quaker Drab with minute black pigment spots thus giving the general appearance of Deep Violet-Gray to Dark Violet-Gray. A faint Buff Brown vertebral line on posterior third of body and dorsal keel of tail. Chin Pale Rose-Purple with superimposed minute black pigment spots, thus giving appearance of gray. Top of head flecked with small spots of Olive-Brown. Chin, sides and venter with numerous

lighter spots of Marguerite Yellow which sometimes tend to form more or less distinct rows on the sides. Tip of snout Ecru-Olive; Deep Olive-Beff spots on top of head. Lateral head stripes running from tip of snout to gills Isabella Color. Legs Pale Olive-Beff ground color with minute black pigment spots. Gills Olive-Citrine at base approaching Clove-Brown distally; gill filaments Mikado Brown to Orange Cinnamon.

Non-paratypic material.—A series of specimens in the United States National Museum from Upson, Maverick County, Texas (USNM 10853, 10855, 10857, 10860), and another series in the same institution from Matamoros, Tamaulipas, Mexico (USNM 4048-7 specimens, 4075), were purposely omitted from the list of paratypes and are only tentatively included in *nettingi*. In the specimens on which costal grooves can be counted, 36 occurs once, 37 five times and 38 twice. They are much larger than *nettingi* from other regions, the largest specimen, a female, having a total length of 612 mm and a snout-to-vent length of 423 mm. Noble and Marshall (1932, Amer. Mus. Novitates, no. 532: 5) also report that some of the specimens from the former locality have larger ovarian eggs than do specimens from the vicinity of Imboden. Furthermore, specimens that I have seen from both of these localities, have more pointed tails than do typical *nettingi*. Unfortunately, the material from southern Texas and northern Tamaulipas is inadequate, old, and poorly preserved, and the decision as to its true status is deferred until a field trip to this region can provide a series of fresh specimens.

Remarks.—The recognition of this new race should help to clarify the taxonomic situation in the genus *Siren*. Much of the difficulty in the past has been brought about by the attempt to make more than one form fit under a single name. Others have recognized that there is more than one race of *intermedia*. Noble and Marshall (*op. cit.*: 7) have stated in this connection: "Our smallest breeding females and all those with only thirty-one and thirty-two costal grooves come from Georgia and South Carolina. Future work may show that this is not identical with the *Siren* of the central states, which have from thirty-four to thirty-six costal grooves and rarely thirty-three." Furthermore, Percy Viosca, Jr., in a letter dated Jan. 27, 1941, says, "The eastern ones are black and those west of St. Tammany Parish are greenish grey with lighter spots underneath."

Thus on the Atlantic Coastal Plain there are two species of *Siren*, *lacertina* and *intermedia*, which have, on the average, 38 and 33 costal grooves respectively. While *lacertina* is not known west of Florida, typical *intermedia* ranges westward along the coastal plain to the Florida

Parishes of Louisiana, where it meets the western form, *nettingi*. Throughout most of its range *nettingi* has from 34 to 36 costal grooves, but specimens from the southwestern portion of its range have 37 or 38, and may, when sufficient fresh material is available from this region, prove to constitute still another race.

The following diagnoses should serve for the identification of most specimens of *Siren* except poorly preserved material on which costal grooves cannot be counted. It should be remembered that the salamanders of this genus tend to lose their color pattern rapidly in preservatives, and that the costal groove count is therefore of primary importance in identifying museum specimens.

Olive above with numerous circular black spots on top of head, dorsum and sides; light markings on body, if present, restricted to lateral and ventrolateral rows of very narrow, short white bars; 38 costal grooves. (District of Columbia south to southern Florida, in the coastal plain.)

Siren lacertina Linné

Usually uniformly dark above, somewhat lighter below, with no pronounced light spots; 31-34 costal grooves. (In the coastal plain from South Carolina to Pasco Co., Florida, and west to the Florida Parishes of Louisiana. Also reported from Virginia by Noble and Marshall, *op. cit.*: 7.)

Siren intermedia intermedia Le Conte

Light olive to gray above, black pigment restricted to very small dots; sides and venter often with numerous light spots; 34-36 costal grooves, rarely 33 or 37-38. (Southern Louisiana northward to southern Illinois and Indiana, west and south to Maverick Co., Texas, and northern Tamaulipas, Mexico.).....*Siren intermedia nettingi* Goin

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